August 22, 2025

Therapixel
Pierre Fillard
Chief Scientific Officer
455 Promenade des Anglais
Nice, 06200
FRANCE

Re: K243685
Trade/Device Name: MammoScreen BD
Regulation Number: 21 CFR 892.2050
Regulation Name: Medical Image Management And Processing System
Regulatory Class: Class II
Product Code: QIH
Dated: July 23, 2025
Received: July 23, 2025

Dear Pierre Fillard:

We have reviewed your section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (the Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

FDA's substantial equivalence determination also included the review and clearance of your Predetermined Change Control Plan (PCCP). Under section 515C(b)(1) of the Act, a new premarket notification is not required for a change to a device cleared under section 510(k) of the Act, if such change is consistent with an established PCCP granted pursuant to section 515C(b)(2) of the Act. Under 21 CFR 807.81(a)(3), a new

premarket notification is required if there is a major change or modification in the intended use of a device, or if there is a change or modification in a device that could significantly affect the safety or effectiveness of the device, e.g., a significant change or modification in design, material, chemical composition, energy source, or manufacturing process. Accordingly, if deviations from the established PCCP result in a major change or modification in the intended use of the device, or result in a change or modification in the device that could significantly affect the safety or effectiveness of the device, then a new premarket notification would be required consistent with section 515C(b)(1) of the Act and 21 CFR 807.81(a)(3). Failure to submit such a premarket submission would constitute adulteration and misbranding under sections 501(f)(1)(B) and 502(o) of the Act, respectively.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device" (https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality System (QS) regulation (21 CFR Part 820), which includes, but is not limited to, 21 CFR 820.30, Design controls; 21 CFR 820.90, Nonconforming product; and 21 CFR 820.100, Corrective and preventive action. Please note that regardless of whether a change requires premarket review, the QS regulation requires device manufacturers to review and approve changes to device design and production (21 CFR 820.30 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR Part 803) for devices or postmarketing safety reporting (21 CFR Part 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

All medical devices, including Class I and unclassified devices and combination product device constituent parts are required to be in compliance with the final Unique Device Identification System rule ("UDI Rule"). The UDI Rule requires, among other things, that a device bear a unique device identifier (UDI) on its label and package (21 CFR 801.20(a)) unless an exception or alternative applies (21 CFR 801.20(b)) and that the dates on the device label be formatted in accordance with 21 CFR 801.18. The UDI Rule (21 CFR 830.300(a) and 830.320(b)) also requires that certain information be submitted to the Global Unique Device Identification Database (GUDID) (21 CFR Part 830 Subpart E). For additional information on these requirements, please see the UDI System webpage at https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-system-udi-system.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part

803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

MARJAN NABILI -S for

Yanna Kang, Ph.D.
Assistant Director
Mammography and Ultrasound Team
DHT8C: Division of Radiological
Imaging and Radiation Therapy Devices
OHT8: Office of Radiological Health
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 07/31/2026
See PRA Statement below.

Submission Number *(if known)*

K243685

Device Name

MammoScreen BD

Indications for Use *(Describe)*

MammoScreen® BD is a software application intended for use with compatible full-field digital mammography and digital breast tomosynthesis systems. MammoScreen BD evaluates the breast tissue composition to provide an ACR BI-RADS 5th Edition breast density category. The device is intended to be used in the population of asymptomatic women undergoing screening mammography who are at least 40 years old.

MammoScreen BD only produces adjunctive information to aid interpreting physicians in the assessment of breast tissue composition. It is not a diagnostic software.

Patient management decisions should not be made solely based on analysis by MammoScreen BD.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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510(k) Summary
K243685

This 510(k) summary of safety and effectiveness information is prepared in accordance with the requirements of 21 CFR § 807.92.

Applicant Information: Therapixel
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06200 Nice
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Phone: +33 9 72 55 20 39

Submission Correspondent: Pierre Fillard
Chief Scientific Officer
Email: pfillard@therapixel.com
Phone: +33 6 83 71 28 09

Date Summary Prepared: Nov 20, 2024

Device Information:

Trade Name:	MammoScreen® BD
Common Name:	Breast Density Assessment Software
Device Classification Name:	Automated radiological image processing software
Regulation Number:	21 CFR §892.2050
Regulation Class:	Class II
Product Code:	QIH
Submission type	Traditional 510(k)
510(k) number:	K243685

Predicate Device:

The predicate device is MammoScreen® BD by Therapixel, cleared under K241561 (Product code QIH).

Device Description:

MammoScreen BD is a software-only device (SaMD) using artificial intelligence to assist radiologists in the interpretation of mammograms. The purpose of the MammoScreen BD software is to automatically process a mammogram to assess the density of the breasts.

MammoScreen BD processes the 2D-mammograms standard views (CC and/or MLO of FFDM and/or the 2DSM from the DBT) to assess breast density.

For each examination, MammoScreen BD outputs the breast density following the ACR BI-RADS 5th Edition breast density category.

MammoScreen BD outputs can be integrated with compatible third-party software such as MammoScreen Suite. Results may be displayed in a web UI, as a DICOM Structured Report, a DICOM Secondary Capture Image, or within patient worklists by the third-party software.

MammoScreen BD takes as input a folder with images in DICOM formats and outputs breast density assessment in a form of a JSON file.

Note that the MammoScreen BD outputs should be used as complementary information by radiologists while interpreting breast density. Patient management decisions should not be made solely on the basis of analysis by MammoScreen BD, the medical professional interpreting the mammogram remains the sole decision-maker.

Indication for Use:

MammoScreen® BD is a software application intended for use with compatible full-field digital mammography and digital breast tomosynthesis systems. MammoScreen BD evaluates the breast tissue composition to provide an ACR BI-RADS 5th Edition breast density category. The device is intended to be used in the population of asymptomatic women undergoing screening mammography who are at least 40 years old.

MammoScreen BD only produces adjunctive information to aid interpreting physicians in the assessment of breast tissue composition. It is not a diagnostic software.

Patient management decisions should not be made solely based on analysis by MammoScreen BD.

<u>Intended user population</u>

Intended users of MammoScreen BD are physicians interpreting mammograms.

<u>Intended patient population</u>

The device is intended to be used in the population of asymptomatic women undergoing screening mammography who are at least 40 years old.

Predicate device comparison:

	Predicate device (MammoScreen BD – K241561)	Subject device (MammoScreen BD – K243685)
Manufacturer	Therapixel	Therapixel
Regulation number	892.2050	892.2050
Product Code	QIH	QIH
Medical Class Device	Class II	Class II
Intended Use	MammoScreen® BD is a software application intended for use with compatible full-field digital mammography and digital breast tomosynthesis systems. MammoScreen BD evaluates the breast tissue composition to provide an ACR BI-RADS 5th Edition breast density category. The device is intended to be used in the population of asymptomatic women undergoing screening mammography who are at least 40 years old. MammoScreen BD only produces adjunctive information to aid interpreting physicians in the assessment of breast tissue composition. It is not a diagnostic software. Patient management decisions should not be made solely based on analysis by MammoScreen BD.	MammoScreen® BD is a software application intended for use with compatible full-field digital mammography and digital breast tomosynthesis systems. MammoScreen BD evaluates the breast tissue composition to provide an ACR BI-RADS 5th Edition breast density category. The device is intended to be used in the population of asymptomatic women undergoing screening mammography who are at least 40 years old. MammoScreen BD only produces adjunctive information to aid interpreting physicians in the assessment of breast tissue composition. It is not a diagnostic software. Patient management decisions should not be made solely based on analysis by MammoScreen BD.
Intended patient population	Asymptomatic women undergoing mammography	Asymptomatic women undergoing mammography
Intended user population	Interpreting physicians	Interpreting physicians
Anatomical Location	Breast	Breast
Design	Software-only device	Software-only device
Type of artificial intelligence	Supervised Machine Learning	Supervised Machine Learning
Input	Compatible full-field digital mammography and digital breast tomosynthesis systems (using Synthetic 2D (2DSM)) for Hologic.	Compatible full-field digital mammography and digital breast tomosynthesis systems (using Synthetic 2D (2DSM)) for Hologic and GE.
Output	Breast density assessment based on ACR BIRADS 5th edition category at the mammogram level.	Breast density assessment based on ACR BIRADS 5th edition category at the mammogram level.
Support of Hologic Envision system and GE mammograms	Not included	Included
Inclusion of PCCP	Predetermined Change Control Plan (PCCP) including:	Predetermined Change Control Plan (PCCP) including:

	• Support of GE mammograms (no re-training required) • Support of Siemens mammograms (retraining required) • Pre-training of backbone using Unsupervised Machine Learning (as opposed to Supervised Machine Learning)	• Support of Siemens mammograms (retraining required) • Pre-training of backbone using Unsupervised Machine Learning (as opposed to Supervised Machine Learning)

The indication for the use of MammoScreen BD is similar to that of the predicate device. Both devices are intended for concurrent use by physicians interpreting breast images to help them with assessing the breast tissue composition. The devices are not intended as a replacement for the review of a physician or their clinical judgment.

The predicate device and the subject device are two software versions of MammoScreen BD. They both rely on the same fundamental scientific technology. The design changes of this new version of MammoScreen BD have been assessed at the software design level and do not raise different questions of safety and effectiveness than the previous version. For both devices, a choice of medical image processing and machine learning techniques are implemented. The system includes 'deep learning' modules for the assessment of the breast tissue composition. These modules are trained with very large databases of annotated mammograms.

The overall design of MammoScreen BD is the same than the design of the predicate device. Both versions assess the breast tissue composition in radiological breast images and provide information about the assessment of the breast density category to the user in the same manner. While MammoScreen BD has been evaluated on mammograms acquired with a wider range of systems to accept those, these modifications do not raise different questions about the safety and effectiveness of the device as compared to the predicate device. The devices have the same intended use. The modifications do not raise different questions about the safety and effectiveness of the device as compared to the predicate device. The safety and effectiveness of the device have been evaluated with a similar methodology as for the predicate device.

Training dataset

De-identified screening mammograms used for training were retrospectively collected from 32,368 patients in 2 different US sites. A detailed description of the training data is available in the Table below:

Total number of studies	108,775
Density distribution	A: 12.79% B: 34.58% C: 42.94% D: 9.38% Unknown (excluded): 0.31%
Patient ages	First quartile (Q1): 47.0 Mean: 56.0 Third quartile (Q3): 64.0
Patient Race / Ethnicity	White: 49.13% Asian: 7.63% Black or African American: 0.43% Native Hawaiian or Pacific Islander: 0.09% Unknown: 42.72%
Manufacturer	Hologic: 61.63% GE: 38.37%

Non-Clinical Performance Testing

MammoScreen BD is a software-only device.

Tests have been performed in compliance with the following recognized consensus standards:

- IEC 62304:2006/A1:2016- Medical device software - Software life-cycle processes
- IEC 62366-1:2015+AMD1:2020- Medical devices - Application of usability engineering to medical devices.

MammoScreen BD has successfully completed integration and verification testing and beta validation. In addition, potential hazards have been evaluated and mitigated, and have acceptable levels.

As for the predicate device, the clinical validation of MammoScreen BD includes a standalone analysis of the software against a ground truth established by consensus among the visual assessment of 5 breast radiologists, results of this latter for Hologic Envision system are reported in Figure 1.

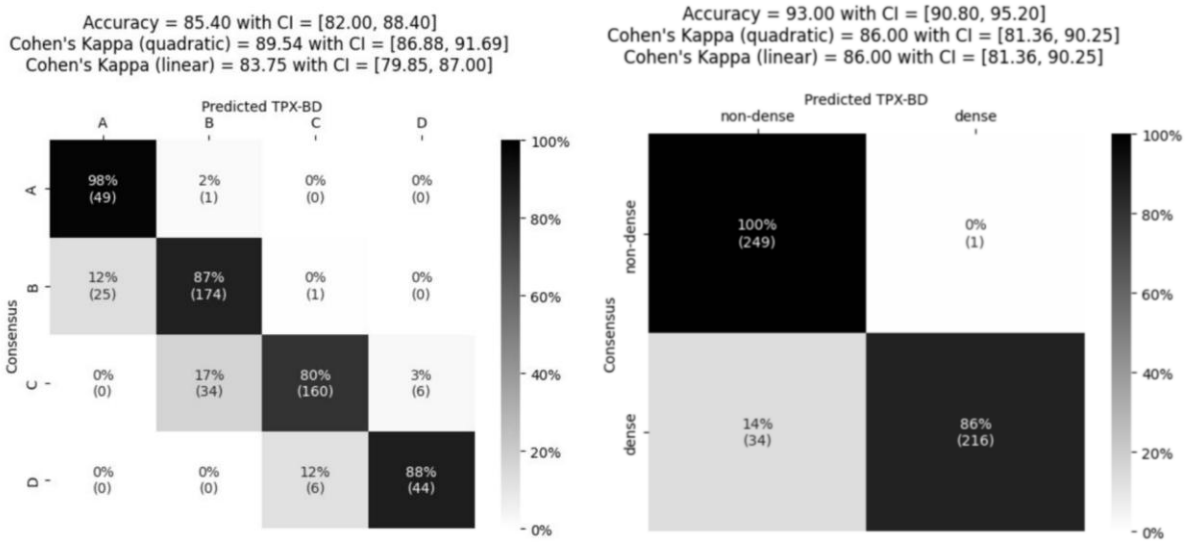

Figure 1 – (Left) Confusion matrix comparing the performance of MammoScreen-BD against the radiologist consensus assessment of breast density for the four-class BI-RADS breast density task on Hologic Envision. (Right) Confusion matrix comparing the performance of MammoScreen BD against the radiologist consensus assessment of breast density for the binary task. The number of exams within each bin is shown in parentheses.

The performance testing results indicate that the version MammoScreen BD algorithm does not pose any concerns regarding safety or effectiveness on a wider range of mammogram system. MammoScreen BD behaves equally well on CC and MLO views (Figure 2) and between different age groups and breast thicknesses.

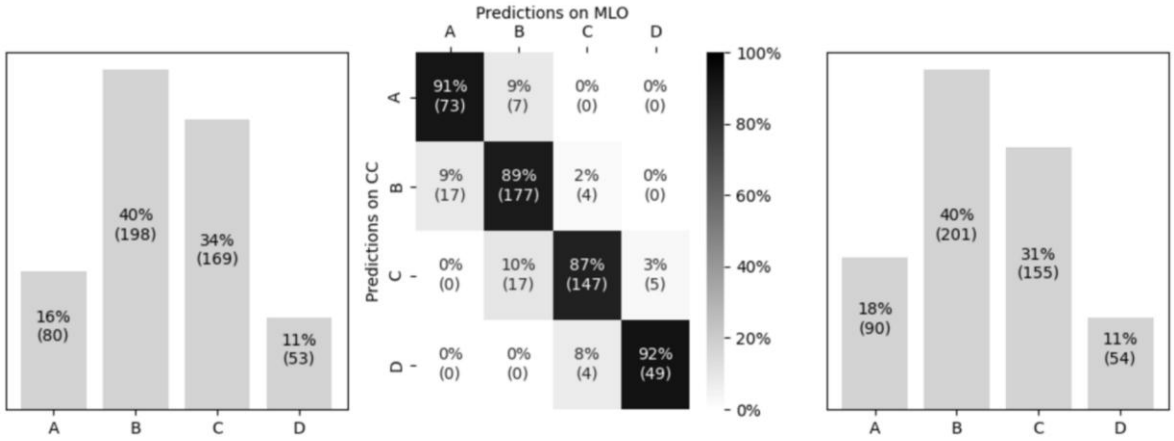

Figure 2 - Contingency matrix comparing the breast density assessment (four-class BI-RADS breast density) of MammoScreen BD on CC and MLO views of the same patient (Hologic Envision). Individual assessments for CC (left) and MLO (right) are given. The number of exams within each bin is shown in parentheses.

Additionally, it was established that MammoScreen BD is non-inferior to the targeted performance.

The standalone performance testing carried out to validate the device is summarized in what follows:

	Hologic	Hologic Envision	GE
Statistics tests for primary objective	Superiority in standalone performance for density assignment of MammoScreen BD compared to a pre-determined reference value ($Kappa_{reference}$ = 0.85).		
Primary endpoint	No change from previous clearance. Quadratically weighted Cohen's kappa between the density assessment of MammoScreen BD and the established ground truth. Kappa quadratic = 89.03 [95% CI: 87.43 – 90.56]	Quadratically weighted Cohen's kappa between the density assessment of MammoScreen BD and the established ground truth. Kappa quadratic = 89.54 [95% CI: 86.88 – 91.69]	Quadratically weighted Cohen's kappa between the density assessment of MammoScreen BD and the established ground truth. Kappa quadratic = 93.19 [95% CI: 90.50 – 94.92]
Acceptance criteria	The one-sided *p*-value for the test H0: Kappa ≤ 0.85 is less than the significance level (α=0.05) and the lower bound of the 95% confidence interval for Kappa > 0.85 indicating that the observed weighted Kappa is statistically significantly greater than 0.85.		
Number of included patients	922	500	376
Number of included studies	1,155	500	490
Age distribution	*Range: [40 – 90]* *First quartile (Q1): 50.0* *Mean: 58.5* *Third quartile (Q3 : 66.0* • *Age < 55: 570* • *55 ≤ Age < 65: 308* • *Age ≥ 65: 269*	*Range: [36 – 86]* *First quartile (Q1): 48.0* *Mean: 56.0* *Third quartile (Q3): 65.0* • *Age < 55: 234* • *55 ≤ Age < 65: 130* • *Age ≥ 65: 136*	*Range: [31 -86]* *First quartile (Q1) : 47.0* *Mean : 57.2* *Third quartile (Q3): 67.0* • *Age < 55: 234* • *55 ≤ Age < 65: 130* • *Age ≥ 65: 136*
Race and Ethnicity distribution	*White: 273* *Asian: 102* *Black or African American: 88* *American indian or alaska native: 4* *Native hawaiian or pacific islander: 4*	*Asian*: 6 *White*: 401 *Black or African American*: 40 *Hispanic*: 23 *Not Hispanic*: 388	*Asian: 48* *White: 48* *Black: 41* *Other (including American Indian, Alaska Native, Native Hawaiian or Other Pacific Islander): 83* *Hispanic: 88*
Considered subgroups	Age		
	Age < 55: A(53), B(182), C(239), D(96) *55 ≤ Age < 65: A(26), B(115), C(129), D(38)* *Age ≥ 65: A(34), B(138), C(83), D(14)*	*Age < 55: A(21), B(73), C(103), D(37)* *55 ≤ Age < 65: A(14), B(59), C(52), D(4)* *Age ≥ 65: A(15), B(68), C(45), D(8)*	*Age < 55: A(9), B(44), C(118), D(37)* *55 ≤ Age < 65: A(15), B(73), C(41), D(9)* *Age ≥ 65: A(18), B(83), C(41), D(4)*
	Race		
	Asian: *A(2), B(52), C(61), D(17)* White: *A(59), B(176), C(137), D(34)*	Asian: *A(0), B(2), C(2), D(2)* White: *A(42), B(163), C(159), D(37)*	Asian: *A(1), B(31), C(28), D(8)* White: *A(11), B(17), C(21), D(7)* Black: *A(8), B(21), C(16), D(3)* Other: *A(9), B(59), C(48), D(10)*

	Black: *A(20), B(32), C(34), D(9)* Other: *A(1), B(3), C(4), D(0)*	Black: *A(3), B(16), C(18), D(3)* Hispanic: *A(1), B(8), C(12), D(2)* Not Hispanic: *A(39), B(160), C(148), D(41)*	Hispanic: *A(5), B(13), C(11), D(3)*
	Data provenance		
	USA: *A(85), B(269), C(241), D(63)* EU: *A(28), B(169), C(214), D(86)*	USA: *A(50), B(200), C(200), D(50)*	USA: *A(38), B(155), C(139), D(31)* EU: *A(4), B(45), C(61), D(19)*
	Breast thickness		
	Thick. < 50: A(7), B(80), C(145), D(87) *50 ≤ Thick. < 70: A(43), B(272), C(252), D(58)* *Thick. ≥ 70: A(63), B(86), C(58), D(4)*	*Thick. < 50: A(4), B(25), C(47), D(28)* *50 ≤ Thick. < 70: A(25), B(104), C(115), D(20)* *Thick. ≥ 70: A(21), B(71), C(38), D(2)*	*Thick. < 50: A(33), B(135), C(142), D(46)* *50 ≤ Thick. < 70: A(4), B(51), C(49), D(3)* *Thick. ≥ 70: A(5), B(14), C(9), D(1)*
Truthing process	The reference standard for breast density value was established by majority rule among the assessment of 5 breast radiologists with at least 10 years of experience in breast imaging interpretation.		
Independence of test data from training data	Data sources are separated into the training/tuning group and the test group. Sources in the training/tuning group may only be used for model training and tuning. Sources in the test group may only be used for external validation of the model's performances on unseen data (i.e., from sources entirely left out during training and tuning). Data used for the standalone performance testing only belongs to the test group.		

Predetermined Change Control Plan (PCCP)

MammoScreen BD is powered by machine-learning neural architectures. Therapixel will make future algorithm improvements under a PCCP. The plan describes the future modifications, assesses their impact, and a modification protocol details how data management, re-training, performance evaluation and update procedures will be handled. The table below lists the anticipated modifications.

	Modification #1 **Support of Siemens Mammograms (retraining required)**	**Modification #2** **Pre-training of backbone using Unsupervised Machine Learning (as opposed to Supervised Machine Learning)**
Data used for development and modifications, representing the target population	Siemens, FFDM Siemens, 2DSM.	No new data collection is foreseen for this change.
Statistics tests for primary objective	Superiority in standalone performance for density assignment of MammoScreen BD compared to a pre-determined reference value ($Kappa_{reference}$ = 0.85).	

Primary endpoints	Quadratically weighted Cohen's kappa between the density assessment of MammoScreen and the established ground truth
Acceptance criteria	Lower bound of the 95% confidence interval > 0.85
Validation activities	Upon demonstration of the superiority through the standalone performance testing, changes will be documented in a minor release amending: • The Algorithm test protocol and results documents • The Device Label, including the User Guide
Communication plan	Upcoming updates are communicated through advisory notices sent by email at least 2 weeks before deployment. Advisory notices contain: • The new version identification, • A summary of the change, • The schedule for the application of the change, • Statement that the Support team will contact the customer and/or user for acceptance, training or scheduling of the change, if necessary, • A link to access the updated User Guide, where the changes mentioned are reflected. Users may decide to opt out of the update during the 2-week notice period. MammoScreen BD does not have its own user interface. The new labelling for MammoScreen BD will be available on the compatible third-party software once the update is activated.
Characterization of the device before and after implementation of changes	The device will be accessible to more centers, and thus to more woman. Prevents obsolescence of MammoScreen BD. Better representation of breast tissue diversity leading to higher overall performances and a better generalization on unseen data.
Monitoring, detection, and response to deviations in device performance	Therapixel monitors customer sites. The distribution of breast density assessment obtained is determined on a representative screening distribution, which serves as a Reference Distribution. Device monitoring compares breast density assessment in real conditions to the reference distribution and alerts of any deviations. The investigation can result in a field-safety notice, a Medical Device Report.

Conclusions

Performance testing results demonstrated that the device is safe and effective.

Therapixel has applied a risk management process following FDA-recognized standards to identify, evaluate, and mitigate all known hazards related to MammoScreen BD. All identified risks are effectively mitigated, and it can be concluded that the residual risk is outweighed by the benefits. Considering all data in this submission, the data provided in these 510(k) supports the safe and effective use of MammoScreen BD for its indications for use and substantial equivalence to the predicate device.